

**IN THE CLAIMS:**

1. (currently amended) A heat-sensitive recording material which comprises ~~at least~~
  - (a) a support (S), ~~(b) a heat sensitive recording layer formed on at least one side of the support and containing an electron-donating compound and an electron accepting compound~~
  - (b2) a heat-sensitive recording layer (TG) containing an electron-donating compound and an electron-accepting compound and formed on at least one side of the support (S) and an adhesive layer (EB) comprising an electron beam-cured resin and formed on the heat-sensitive recording layer (TG), or
  - (b3) an adhesive layer formed (EB) comprising an electron beam-cured resin and formed on at least one side of the support (S) and a heat-sensitive recording layer (TG) containing an electron-donating compound and an electron-accepting compound and formed on the adhesive layer (EB);  
and
  - (c) a protective layer (OC) comprising a water-soluble resin and/or a water-dispersible resin, and optionally,

(d) an intermediate layer (ML) comprising a water-soluble resin and/or a water-dispersible resin and formed between the heat-sensitive recording layer (TG) and the adhesive layer (EB),

the protective layer (OC) being ~~an~~ being the outermost layer provided by being formed on a smooth-surfaced substrate and removing the smooth-surfaced substrate [and],

the smooth-surfaced substrate being 0.05 to 0.20 µm in root-mean-square average of roughness (JIS B0601-1982) as determined by an interference microscope (JIS B0652-1973),

the protective layer surface having a distinctness of image (according to JIS K 7105-1981) of at least 75% (slit width 2 mm),  
and

the adhesive layer containing a pigment having an average particle size of 0.2 to 3 µm.

2. (original) The heat-sensitive recording material according to claim 1, wherein the recorded portion formed by carrying out recording from the protective layer side with an energy of 80 mJ/mm<sup>2</sup> by a thermal head shows a distinctness of image (according to JIS K 7105-1981) of at least 75% (slit width 2 mm).

3. (original) The heat-sensitive recording material according to claim 1, wherein the recorded portion formed by carrying out recording from the protective layer side with an energy of 80 mJ/mm<sup>2</sup> by a thermal head is 0.15 to 0.50 µm in root-mean-square average of roughness (according to JIS B0601-1982) as determined by an interference microscope (JIS B0652-1973).

4. (original) The heat-sensitive recording material according to claim 1, wherein the recorded portion formed by carrying out recording from the protective layer side with an energy of 80 mJ/mm<sup>2</sup> by a thermal head exhibits a gloss (JIS P 8142-1993) of 30% or more at 20 degrees and 85% or more at 75 degrees.

5. (canceled)

6. (canceled)

7. (currently amended) The heat-sensitive recording material according to ~~claim 6~~ claim 1 which comprises:

- (a) the support (S),
- (b) the heat-sensitive recording layer (TG) formed on one side of the support (S), the intermediate layer (ML)

formed on the heat-sensitive recording layer and the adhesive layer (EB) formed on the intermediate layer, and

(c) the protective layer (OC) formed on the adhesive layer (EB).

8. (canceled)

9. (currently amended) The heat-sensitive recording material according to ~~claim 7~~ claim 1, wherein the adhesive layer is provided by forming an uncured adhesive layer containing an electron beam-curable compound and curing the electron beam-curable compound by irradiation with electron beam.

10. (original) The heat-sensitive recording material according to claim 9, wherein the electron beam-curable compound is a hydroxyl group-containing electron beam-curable compound.

11. (original) The heat-sensitive recording material according to claim 10, wherein the hydroxyl group-containing electron beam-curable compound is 2-hydroxyethyl (meth)acrylate, 2-hydroxypropyl (meth)acrylate, 2-hydroxy-3-phenoxypropyl acrylate or

(meth)acrylic acid condensate of epichlorohydrin-alkanediol polymer.

12. (withdrawn) A process for producing a heat-sensitive recording material which comprises:

- (e) a support (S),
- (f) (b1) ~~a heat sensitive recording layer (TG) formed on at least one side of the support, or~~
- (b2) a heat-sensitive recording layer (TG) containing an electron-donating compound and an electron-accepting compound formed on at least one side of the support (S) and an adhesive layer (EB) comprising an electron beam-cured resin and formed on the heat-sensitive recording layer (TG), or
- (b3) an adhesive layer (EB) comprising an electron beam-cured resin and formed on at least one side of the support (S) and the heat-sensitive recording layer (TG) containing an electron-donating compound and an electron-accepting compound and formed on the adhesive layer (EB); and

(g) a protective layer (OC) comprising a water-soluble resin and/or a water dispersible resin, and if desired optionally,

(h) an intermediate layer (ML) comprising a water-suble resin and/or a water-dispersible resin and formed between the heat sensitive recording layer (TG) and the protective layer (OC) or between the heat-sensitive recording layer (TG) and the adhesive layer (EB),  
the protective layer surface having a distinctness of image of at least 75% (according to JIS K 7105-1981, slit width 2 mm), and the adhesive layer containing a pigment having an average particle size of 0.2 to 3 µm,

the process comprising forming the protective layer on a smooth-surfaced substrate with a smooth surface which is about 0.05 to about 0.20 µm in [[the]] root-mean-square average of roughness (according to JIS B0601-1982) as determined by an interference microscope (according to JIS B0652-1973), and removing the substrate.

13. (withdrawn) The process according to claim 12, which comprises any one of the following processes:

- (i) a process comprising combining
- the protective layer (OC) formed on the smooth-surfaced substrate and comprising a water-soluble or water-dispersible resin with
- a laminate comprising the support (S), the heat-sensitive recording layer (TG), the intermediate layer (ML) and an uncured adhesive layer [[+EB]] comprising an electron beam-curable compound and the pigment having an average particle size of 0.2 to 3  $\mu\text{m}$  in this order,
- in such a manner that the protective layer (OC) is brought into contact with the uncured adhesive layer [[+EB]],
- irradiating the combined product with electron beam to cure the electron beam-curable compound, and removing the smooth-surfaced substrate,
- (ii) a process comprising combining
- ~~the protective layer (OC) formed on the smooth-surfaced substrate and an uncured adhesive layer (EB) comprising an electron beam curable compound and formed on the protective layer, or an uncured protective layer~~

~~(OC(EB)) comprising an electron beam curable compound and formed on a smooth surfaced substrate, with~~

~~a laminate comprising the support (S), the heat-sensitive recording layer (TG) and the intermediate layer (ML) in this order,~~

~~in such a manner that the adhesive layer (EB) or the protective layer (OC(EB)) comprising an electron beam curable compound is brought into contact with the intermediate layer (ML),~~

~~irradiating the combined product with electron beam to cure the electron beam curable compound, and removing the smooth surfaced substrate,~~

(iii)(ii) a process comprising combining

~~the protective layer (OC) comprising a water-soluble resin or water-dispersible resin and formed on the smooth-surfaced substrate and the heat-sensitive recording layer (TG) formed on the protective layer and the intermediate layer (ML) formed on the heat-sensitive recording layer with~~

~~a laminate comprising the support (S) and an uncured adhesive layer [[EB]] comprising an electron beam-~~

curable compound and the pigment having an average particle size of 0.2 to 3  $\mu\text{m}$  in this order,

in such a manner that the intermediate layer (ML) is brought into contact with the uncured adhesive layer [[(EB)]],

irradiating the combined product with electron beam to cure the electron beam-curable compound, and removing the smooth-surfaced substrate,

(iv) (iii) a process comprising combining  
the substrate (S)

with a laminate formed on the smooth-surfaced substrate and comprising the protective layer (OC) ~~comprising a water soluble or water dispersible resin,~~ the heat-sensitive recording layer (TG), ~~the intermediate layer (ML)~~ and an uncured adhesive layer [[(EB)]]] comprising an electron beam-curable compound in this order,

in such a manner that the uncured adhesive layer [[(EB)]]] is brought into contact with the support (S),

irradiating the combined product with electron beam to cure the electron beam-curable compound, and removing the smooth-surfaced substrate. substrate, and

(v) — a process comprising combining  
~~a laminate comprising an uncured protective layer (OC(EB)) comprising an electron beam curable compound, an intermediate layer (ML), a heat sensitive recording layer (TG) and a support (S) in this order, with a smooth surfaced substrate,~~  
~~in such a manner that the uncured protective layer (OC(EB)) is brought into contact with the smooth surfaced substrate,~~  
~~irradiating the combined product with electron beam to cure the electron beam curable compound, and removing the smooth surfaced substrate.~~

14. (withdrawn) A process The process according to claim 13, wherein the adhesive layer ~~contains~~ contains said pigment having an average particle size of 0.2 to 3  $\mu\text{m}$  in an amount of 2 to 30% by weight based on the adhesive layer.

15. (withdrawn) A process The process according to claim 13, wherein the electron beam-curable compound is a hydroxyl group-containing electron beam-curable compound.

16. (withdrawn) ~~A process~~ The process according to ~~claim~~  
~~13~~ claim 15, wherein the hydroxyl group-containing electron beam-curable compound is 2-hydroxyethyl (meth)acrylate, 2-hydroxypropyl (meth)acrylate, 2-hydroxy-3-phenoxypropyl acrylate or (meth)acrylic acid condensate of epichlorohydrin-alkanediol polymer.

17. (new) The heat-sensitive recording material according to claim 1 which comprises:

- the support (S),
- the adhesive layer (EB) formed on the support,
- the heat-sensitive recording layer (TG) formed on the adhesive layer (EB), and
- the protective layer (OC) formed on the adhesive layer (TG).

18. (new) The heat-sensitive recording material according to claim 1 which comprises:

- the support (S),
- the adhesive layer (EB) formed on the support,
- the intermediate layer (ML) formed on the adhesive layer,
- the heat-sensitive recording layer (TG) formed on the adhesive layer, and

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- the protective layer (OC) formed on the adhesive layer.